BULLETIN No. 14. (Dairy No. 5.)

U. S. DEPARTMENT OF AGRICULTURE.

BUREAU OF ANIMAL INDUSTRY.

DAIRYING IN CALIFORNIA.

BY

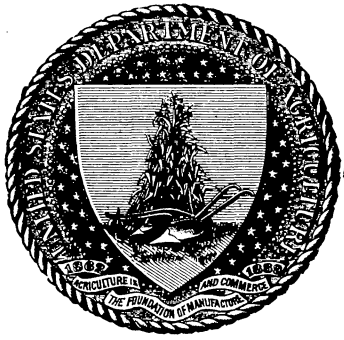
PROF. E. J WICKSON, M. A.,

UNIVERSITY OF CALIFORNIA.

Under the direction of

Dr. D. E. SALMON,

Chief of the Bureau of Animal Industry.



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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
Washington, D. C., July 15, 1896.

SIR: I have the honor to transmit herewith for publication, as a bulletin of this Bureau, the manuscript of a report, prepared under the direction of Henry E. Alvord, Chief of the Dairy Division, by Prof. E. J. Wickson, special agent of that division, on the history, development, and present condition of the dairy industry in California. The report is of general interest, and contains many suggestions for practical dairymen operating under very diverse conditions.

Very respectfully,

D. E. SALMON,
Chief of Bureau.

Hon. J. STERLING MORTON,
Secretary of Agriculture.

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DAIRYING IN CALIFORNIA.

HISTORICAL.

The grazing interests of California were established by the Franciscan friars who began their missionary effort for the Christianization of the Digger Indians in 1769 at San Diego. In 1697 their predecessors, the Dominicans, located their first mission on the peninsula of Lower California, and a year later brought thither horses and cattle from Mexico. The offspring of this introduction came northward with the Franciscans and were the progenitors of the vast herds which supplied hides and tallow for a large export trade and were the main source of subsistence for a considerable population of mission wards and Mexican settlers previous to the American occupation. Some idea of the extent of this grazing interest can be gained from the fact that in 1834, after the missions had passed the highest period of their prosperity, their property included 424,000 cattle; 62,500 horses, mules, and asses, and 325,000 sheep, swine, and goats. These figures do not include the property of the settlers away from the missions, nor the countless bands of wild cattle and horses which roamed the plains without mark of ownership. But while cattle were thus abundant and labor was to be had for the commanding, there was practically no dairying. The narratives of travelers state that milk was rare, but the poorest settler had plenty of beef in his pot. Even the goats must have been of very low dairy grade, for one visitor, while acknowledging that the goats were milked, adds that it was difficult to get a pint of milk from six of them. The mission padres had plenty of olive oil to take the place of butter, and wine instead of milk. The Mexican settlers, with few exceptions, did not relish the labor which was required to produce wine and oil and therefore drank water until trade brought them stronger substitutes.

With the American occupation, and notably with the inrush of gold-seekers in 1849, a sharp dairy demand arose. This was supplied in great measure by importation, as will be shown presently, but it called into existence local dairying, the development of which was marked by novel features which invite brief description.

ESTABLISHMENT OF THE DAIRY INDUSTRY BY AMERICANS.

The beginnings of California dairying were made in two regions considerably remote from each other—the mining region amid the foothills of the Sierra Nevadas, which form the eastern boundary of the State,

and the seaboard region adjacent to San Francisco, which lies upon our western boundary. The latter region was destined to achieve great commercial importance, but there was no lack of characteristic uniqueness in the former. Many families of gold seekers who took up the march for the California gold fields from their homes on the prairies of the West, camped their way across the plains, subsisting in part upon the milk of the family cows which they drove before them. Reaching the mines, they found that the milk they had been using so freely would command an almost incredible amount of gold from the miners, and while the male members of the family engaged in mining direct, the female members often gained more dust by caring for and selling the product of their cows. Fresh milk and fresh butter brought them immediate and continued prosperity. Favorable lands were selected, and in these mountain homes grew up large herds and finally valuable dairies which formed the nucleus of the mountain dairy district, which will be mentioned in another connection. This pioneer dairy effort was established with cows bred to milk and with the ordinary dairy skill of the eastern half of the country nearly half a century ago.

EARLY PRACTICES AND PRICES IN THE COAST REGION.

The dairy industry of the coast region of the State was established upon a different basis. The early projector had here a wider opportunity in the demands of the thousands who arrived in San Francisco by sea. The supply of dairy goods consisted of butter and cheese by ship around the Horn from Boston and New York, or was gathered up at South American ports, where only the rudest dairying was practiced. These supplies were inferior to begin with, and were rendered almost inedible by the deteriorating influences of long sea voyages. Almost anything in the form of butter and cheese, freshly made, was greedily welcomed. Money was plentiful, and fresh butter commanded $1.50 and cheese 40 cents per pound. But there were hardships in the way of production, even at these prices. Few cows were to be had except those of the hide-and-tallow breed of the Mexicans. To get any milk at all, this cow had to be lassoed and tied to a stake and allowed the company of her calf before a drop could be secured. Very soon, too, even these unprofitable animals became scarce, because of the vast inroads upon the available beef supply made by the hungry hordes of miners. High beef prices induced the driving westward of large herds of cattle from the Western States and from Texas, and this introduction brought to the pioneer dairyman stock which was poor enough from a dairy point of view, but still vastly better than that of the Mexicans. This movement of cattle soon proceeded beyond local needs for beef and prices ran low, but the inferiority of the stock as dairy producers was clear, from the fact that while the best of the 4-year-olds could be bought for $10 each, and pasturage was almost free, the price of butter was 38 cents and of cheese 15 cents per pound. But if

the cattle were bad, the dairy practice was a match for them. Nothing better than the roughest sheds were used to shelter the milk and dairy apparatus and to cure the cheese, and the cattle had no shelter whatever. The mild climate made this possible. The products themselves fluctuated in a way almost incredible. As late as 1858 cheese made from skimmed milk and sweet buttermilk combined sold at 25 and 27 cents per pound the same day it was taken from the hoop, and butter brought $1 a pound. Within two years these prices were quartered and the ruling rates were counted unprofitable, as indeed they were under the conditions then prevailing.

Under these circumstances the poorest dairymen went into other pursuits and the poorest cows to the butcher. Men with some dairy insight pushed forward into better systems of operation, cows were selected and trained for dairy production, pasture lands were purchased or leased in large areas, and the California system of large private ownership of lands and cows, with leaseholds to operating tenants, arose. This system of dairying with leased lands and cows will be described later.

MORE RECENT ASPECTS OF THE INDUSTRY.

During the decade following 1860 dairy operations were greatly extended. There were very wide fluctuations in market values, and there were serious losses of stock from drought, which the dairymen had not yet learned to provide against; but, on the whole, the business was very profitable, although still very wastefully conducted. The extent of the demand can be seen from allusion to importations. From 1860 to 1865 the importation of butter steadily increased, until in the latter year there was more than 6,700,000 pounds imported, for which more than $2,000,000 was paid. Local production soon began to supplant this importation, but there was about an average of a million pounds of butter brought in by ship each year for several years thereafter. The completion of the overland road also ministered to the supply from distant sources, and during the fall and early winter of each year considerable quantities of oleomargarine and creamery butter from the Chicago region were brought to San Francisco.

Cheese was also largely brought in by ship and rail during the earlier years of California's growth, and, in fact, it was not until about 1878 that local production reached the amount of local needs. From that time to the present there has been a surplus for distant shipment. Until about 1890 this was fairly well disposed of at different places on the coast where new cities were springing up, and where mining, lumbering, and railroad building enterprises were being carried on in advance of dairy development in the immediate localities. At the present time these distant parts of the coast are developing their own dairy resources, and, instead of buying from California, are marketing their surplus so far as possible in California cities. California dairymen have met these changed conditions by the old and accepted dairy weapons, viz, organ-

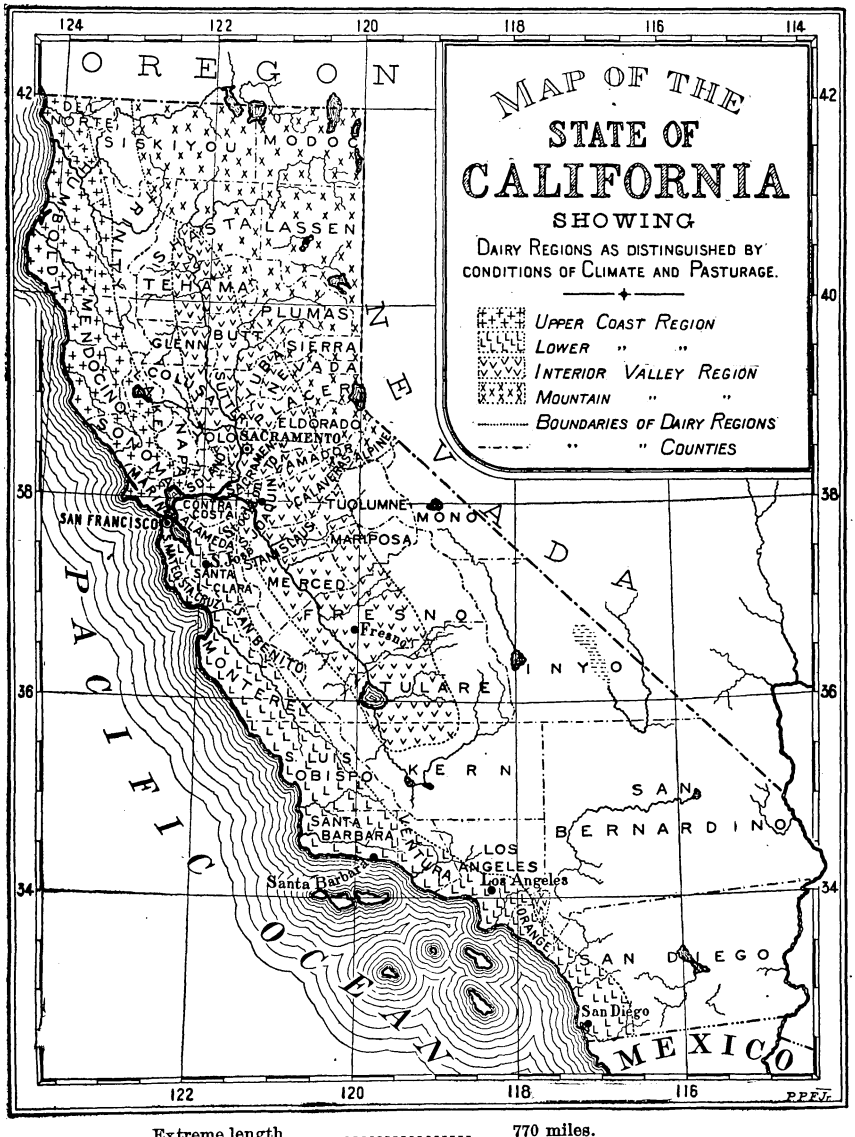
ization for the improvement of practice and the resulting cheapening and higher quality of the product. Thus the creamery system has come to California sometimes as a graft upon the old system of large private dairies, sometimes as supplementary or as a substitute therefor, as will be presently described.

WIDELY DIVERSE DAIRY CONDITIONS IN CALIFORNIA.

Natural conditions affecting dairy practice in California are widely diverse and necessitate differences in practice in nearly all departments of dairy work, from the selection of forage plants and the care of stock, all the way through the dairy curriculum to the manufacture and care of the product. There is no such variation on the Atlantic Slope; but one can find something analogous in European conditions if he take into account the mountain dairying of the Alpine valleys, the moist, diked lands of Holland, the heated, irrigated plains of Italy, and the coast lands of Normandy, with their perennial pastures born of equable temperature, abundant rains, and fog. Close resemblances to all these various conditions can be found within the boundaries of California, and they must be taken into account in any successful attempt to describe the geographical features of the dairy industry in this State. With this fact in view, it is possible to lay down four chief divisions of California dairy lands, based upon a similarity of natural conditions within each of them. These divisions or regions do not comprise compact geographical areas, but are rather long, narrow bands or belts taking an extended range from north to south, with comparatively short east and west extensions. The governing factors, in their demarcation, are: Proximity to the coast, elevation and local topography, rainfall, and other climatic features. The intrusion of some of these factors makes it impossible to follow exactly geographical lines in defining the regions. For ordinary uses, however, they may be arranged as follows: (1) Upper coast, (2) lower coast, (3) interior valley, (4) mountain valley.

FOUR MAIN DIVISIONS OF CALIFORNIA DAIRY LANDS AND CLIMATES.

(1) The upper coast region comprises the counties north of San Francisco which lie west of the Coast Range Mountains and have a salt-water frontage either upon the Pacific or the Bay of San Francisco, or upon both. These are the counties of Marin, Sonoma, Mendocino, Humboldt, and Del Norte on the ocean, and Contra Costa, Solano, and Napa counties on the bay. In the ocean-side counties the dairy is a leading interest, while in the bay counties it is subsidiary. This region is the oldest dairy district in the State, and it is still in the lead both in extent of production and in the employment of progressive methods. The natural conditions for dairying are unsurpassed. The length of the rainy season gives a natural pasturage longer than can be found elsewhere in the State, and the amount of rainfall is such that there never has been a serious drought.



Extreme length	770 miles.
Length of coast line	1,097 geographical miles.
Length of coast line	1,280 statute miles.
Breadth, narrowest part	150 miles.
Breadth, widest part	330 miles.
Contains	156,592 square miles.

On the immediate coast summer fogs refresh the pastures and ocean influences prevent extreme temperatures at any season of the year. Water is, as a rule, abundant and pure, and the soils exceedingly productive of clovers and grasses as well as of cultivated crops for supplementary feeding.

(2) The lower coast region is usually taken to include all the lands on or near the coast from San Francisco southward to San Diego, a distance of, approximately, 500 miles. This region also lies west of the Coast Range—that is, between the main chain of the Coast Range and the ocean—and is therefore subject to ocean influences in varying degrees, increased by proximity to the shore or lessened by distance or by the intervention of ranges of hills, which act as barriers to the progress of ocean winds and fogs. In this extended region the annual rainfall decreases as you go southward at the rate of about 2½ inches to each 100 miles of distance, and the average temperature increases about 1 degree for each 100 miles. This variation is regulated by local topography to a certain extent, but the general change is as noted. Naturally the northern half of this region is the greater in dairy production. The counties of San Mateo, Santa Cruz, Monterey, San Luis Obispo, and the northern half of Santa Barbara have the dairy as a leading industry, with San Luis Obispo at the front. In favorable years this county has made a record as the banner butter county of the State. Also included in this dairy region are the counties of Alameda and Santa Clara, bordering on the Bay of San Francisco, but within their boundaries horticultural production far exceeds the dairy. The same is true of the southern half of Santa Barbara, Ventura, and San Diego counties, while Los Angeles and Orange counties, by virtue of large areas of low, moist land adjacent to the ocean, market a very large dairy product in addition to a large output of fruits and grains from higher lands. Though this coast dairy region south of San Francisco is thus seen to be notable in its adaptation and development in dairy lines, it is inferior to the coast region north of San Francisco, because of its less moisture and greater heat, its shorter pasturage season, its liability to occasional droughts, which about once in a decade have caused serious loss of stock as well as product, and the need of greater effort to produce supplies of supplementary feeds; and yet through the introduction of better system and wiser foresight in dairy operations these difficulties and dangers give infinitely less concern than they did in former years.

(3) The interior valley dairy region comprises lands removed from coast influences. They are situated on the east side of high elevations of the Coast Range, which largely exclude ocean winds and fogs, including all the counties lying in the valleys of the San Joaquin and the Sacramento rivers and their tributaries. These areas comprise one great valley between the foothills of the Sierra Nevada on the east and the Coast Range on the west. It is, approximately, 400 miles long and varies in width from 40 to 60 miles. The valley region also

includes some areas in southern California at a distance from the coast, but owing to the eastward trend of the high Coast Range in southern California conditions are not quite the same. Here and there gaps in these mountains open a path eastward for ocean temperatures and moisture and give to adjacent lowlands a mixture of coast and valley conditions, so that one region intrudes upon the territory of the other. This is notable where the Sacramento and San Joaquin rivers break through the Coast Range to reach San Francisco Bay and where the Salinas and Pajaro rivers flow into Monterey Bay. At these points ocean influences extend far into the interior, being, however, progressively ameliorated by interior heat and drought, as they proceed. The valley region proper does not include these modified areas, and is distinctly free from coast influences except those which surmount the ranges and thus have an effect upon the climate of the whole State. The leading characteristics of the interior valleys are high summer heat and very dry summer air; very small and uncertain rainfall, consequently frequent and severe droughts; a very short season of succulent pasturage, except on irrigated or low, moist river-bottom lands of comparatively small area; scant water supply and that of undesirable warmth; occasional presence of insects in grievous numbers. In short, in their natural conditions these interior valleys are unfitted for dairy husbandry except during the winter, when, if the rainfall be adequate, there is a very free growth of rich pasturage and the temperature conditions are excellent for dairy work.

In these arid lands progressive dairying has made its greatest achievements. The introduction of irrigation and the growth of alfalfa and other plants impossible without it; the use of centrifugal separators to secure the cream which could not be raised in good condition by the gravity method because no refrigerating agency could be had cheaply enough for general use; the construction of buildings excluding high temperatures and the employment of devices for cooling by evaporation of moisture—in fact, by meeting unfavorable conditions at all points by ingenuity and the employment of the latest dairy inventions, dairy manufacturing in the interior of California has been made practicable and profitable, and many lessons can be learned from it for the guidance of practice in other heated, arid regions. As a matter of recent history, it may be added that these interior regions, which were once almost wholly dependent upon the coast and the mountains for their dairy supplies, are now producing for distant shipment.

In all the interior valley region, however, both north and south, differences are in degree rather than in kind, and in all of them the use of naturally moist or irrigated land and advanced dairy practice are the ruling factors of success. Although this region is of vast area, only a small fraction is as yet employed in dairying. Fruit and grain are the chief products, but the dairy would increase as the irrigated area is extended if adequate market demand were assured. At present this does not seem to be the case.

(4) The mountain valley dairy region of California is quite distinct in its characteristics from any of those already mentioned, and it approaches more nearly than any of them to a likeness to the dairy conditions and practice of the Eastern States. In one sense the mountain region is supplementary to the interior valley region, because there began very early in the development of the State an itinerant system of dairying in which the cows were driven back and forth from valley plains to mountain meadows, wintering in the valley and summering in the mountains. This practice chiefly prevailed in the northeast quarter of the State, and while uninclosed public lands yielded abundant free pasturage and prices were high, it was very profitable. As a system it was quite analogous to the Alpine dairying of Switzerland. More recently the occupation of public lands and other adverse conditions have reduced the practice, but some dairymen have permanent locations both below and above, and still migrate twice a year. The system does not favor the use of improved methods and can not long survive.

This is, however, only one phase of mountain dairying, and now the least important one. The early demonstration of the good points of the mountain district was followed by the permanent establishment of dairying. The natural pasturage is superior, and moisture in summer favors the growth of some standard dairy grasses which do not thrive elsewhere in California; the streams and springs run cold water; natural ice can be had, and deep setting in coolers is feasible.

On the other hand, a winter of snow and ice makes the Eastern methods of stock shelter and provender imperative, and distance from market and wagon transportation of products place the producer at something of a disadvantage. While good dairy markets in the mining towns of Nevada could be had, this was not of so much importance, but now that these towns have declined and Nevada has become a shipper of dairy produce to California markets the situation of the mountain dairymen is less satisfactory. The mountain region is, however, one of great reserve force, and in the future growth of the coast will have better opportunity to exercise its excellent productive ability and to use its rich resources. The mountain counties which have made the best records in mountain dairying are Sierra and Plumas, although other counties both north and south of them also have important dairy interests and resources. Siskiyou and Shasta counties have thriving local dairy establishments which find a market in adjacent mining regions. Lassen and Modoc counties have large grazing and grain interests, and with better transportation facilities could largely increase their dairying. The higher elevations of Placer, Nevada, Eldorado, and, in a less degree, Amador and Alpine, have good mountain pastures which are partially utilized, while Mono and Inyo, the only counties in California east of the Sierra Nevada Mountains, have a considerable surplus dairy product which reaches market by means of a railway running thence into Nevada.

THE LEADING DAIRY COUNTY OF CALIFORNIA.

The foregoing sketch of the dairy regions of California includes mention of the counties which lead in this industry. The greatest of all the counties in amount of product, in number of modern establishments, and first in the construction of a modern creamery, is Humboldt County, with a butter product of 2,843,452 pounds in 1892. Although the county has other very important interests, it is the estimate of several well-informed persons that over one-half the population is concerned in dairying, and in some parts of the county quite three-fourths of the people are thus engaged. Probably Humboldt, and Marin in a less degree, are the only counties in which such high percentages rule, but there are parts of other counties in which similar proportions could be given. California has always been marked by local specialization of products. This is to some degree a rational deduction from clearly discerned differentiation in local climates, and in some degree attributable to popular conceptions of greatness in farming policy. It was a very early notion in California that the farming operations of an individual must necessarily cover a vast area of land. It was easy to acquire such areas in early days, and the influence of such acquisitions and of farming methods required by them is still strong, though its departure can now be clearly foreseen. Aside from this, however, there is good reason for much specialization, because conditions change so greatly. On the moist lands of Orange County, for instance, probably about one-third of the people are engaged in dairying, while on the adjacent higher lands there is not only little dairying but probably many of the fruit-growers who use those lands do not even keep family cows.

CALIFORNIA SYSTEM OF LARGE DAIRY HOLDINGS.

The size of the dairy farms and the number of cows to each vary within wide limits. As stated, the old plan was to have very large herds and farms; but the old plan was also to have rather small dairy buildings and enough of them. They were so located that part of the cows could be conveniently driven to each for milking, and a butter or cheese maker was located at each of these branch establishments. As each of these branches must have its own foreman and cook, as well as its own gang of milkers, it was soon seen that a system of tenantry would both relieve the owner and inspire the foreman to watchfulness and zeal. It would also be economical to have the foreman's wife for cook. The result was that a lease price was put upon the branch at so much per cow furnished by the owner, the lessee to furnish his own labor, force, and utensils, and to raise an agreed number of calves each year for the owner; the owner to keep up the number of good cows and to furnish materials for necessary fencing and buildings, for the construction of which the tenant supplied the labor. The tenant paid a cash rent; consequently the produce of the dairy and the swine yard belonged

to him, and there was no division of products to worry about. While dairy prices were good this arrangement was mutually satisfactory to owner and lessee, and with a good large herd of cows the latter was able to secure an income which enabled him to hire all the labor necessary to maintain his family in good style and have a comfortable bank account, which allowed the purchase of good appliances, etc. In this way the system of large single dairies came about in California. Some tenants handled as many as 300 cows and manufactured as much milk as the smaller cooperative establishments at the East received from their patrons. The lease rate per cow naturally declined with the coming of lower values for dairy produce from the old range of $25 to $30 to the present rate of $16 to $20. The tenants' net income declined even more notably. The result has been that many American tenants have saved themselves by introducing creamery outfits, while others gave way to Europeans, who could live on narrower margins and were able to secure labor of their own nationality for less than the former tenants paid. Some of these European dairymen are very bright and enterprising men, and now figure as large dairy proprietors and leaders in the commercial as well as the producing branches of the industry; others are very ignorant and too often squalid, and form a decided barrier to local dairy progress.

Although large dairy holdings still prevail in the older regions, there has been, during the last twenty years, great increase in the number of small dairy farms, and this has been due in part to the subdivision and sale of the old holdings and in part to the advance of the interest into newer parts of the State. The present range of herd numbers of creamery patrons in several counties is as follows:

County.	Average number of cows to the farm.
Siskiyou	30
Humboldt	40
Mendocino	25
San Luis Obispo	75
Santa Barbara	100
Los Angeles, Orange, and San Bernardino	12

CAPACITY OF CALIFORNIA DAIRY LANDS.

The number of acres required for the keeping of a cow in California is determined by local conditions of soil and climate. There are cases in which 1 acre to the cow can be cited, and others in which 2 and even 3 acres are allotted to the cow in estimating the capacity of pasturage. Beyond this there are pastures so scanty that the growth on 5 acres will not exceed the wants of a single animal. The best records are made in the moist, rich, coast valleys of Humboldt County and on the alfalfa lands in the irrigated or the naturally moist sections of the interior valley. Two instances are given by correspondents in Eel River Valley, Humboldt County, viz: Mr. A. Kansen, of Ferndale, keeps 35

cows on 34 acres, secures an average yield of 300 pounds of butter and buys no feed whatever. The cows are on pasture nine months of the year, and for the other three they are fed hay and roots, all grown on the 34 acres. J. E. Brown, also of Ferndale, keeps 35 cows on 40 acres, his average yield and feeding being like the preceding. These records are strictly credible when one knows the natural pasturage conditions prevailing and the favoring climate. The cows are simply good selected grades of dairy breeds. The average in the dairy sections of Humboldt County, that is, on the best of the valley lands, is 1½ acres to a cow.

THE DAIRY BREEDS IN CALIFORNIA.

Although all the leading dairy breeds have secured introduction to California, only three have made a wide and enduring impression on the ordinary run of dairy cattle. They are, both in historical order and extent of influence, as follows: The Shorthorn, the Jersey, and the Holstein-Friesian. The Ayrshire, the Devon, the Guernsey, and others only show their impress in localities adjacent to the few imported herds; they have never taken widely. On the other hand, one can hardly go into the dairy regions anywhere without being able to recognize the marks of the three breeds first named. The Shorthorn gave the first great improvement on the common stock, which was, as already stated, of mixed Mexican and American origin. The breeding of dairy families of Shorthorns has continued with due enterprise and care, and sires of such parentage have always been in request. The Jerseys next secured wide introduction on the basis of cream and butter points, and the Jersey cross became very popular and is still largely used. Then came the Holstein-Friesians, with their great milk yield, and many dairymen, who desired to correct the tendency to decreased size resulting from the Jersey cross, used the black-and-white stock to increase size and capacity. This comment fairly represents the popular conception among dairymen of the relations of these three breeds. We have, of course, individuals who adhere strongly to continuous use of sires of the same breed, and others who rely upon continuous selection from dairy stock of uncertain ancestry. On the whole, the dairy stock of the State is of very good quality and capacity.

DRY FEED AND ITS CHARACTERISTICS.

In the descriptions of the dairy regions of California previously given, there are references to the different lengths of the natural pasturage season in each. Those remarks apply to the natural growth of succulent pasturage. Besides this, there is in California what is locally known as "dry feed," which is quite an important factor in all branches of our live-stock husbandry. This dry feed is simply the growth of grasses and clovers which have naturally matured by the advancing drought of the summer season, and constitute, therefore, an unmown hay on which

the animals subsist. It will occur to the distant reader that it would be better to cut and stack this hay when it is in its best condition than to allow it to desiccate in the sun and wind. Of course, when such wild growth is in suitable quantity on lands convenient to mow, this course is often taken nowadays, but the growth on hillsides or in cañons and the aftermath of low-growing grasses and clovers would cost more than it would yield in the mowing, and much of it, like the rich seed pods of the bur clover (*Medicago denticulata*) and other short growth of leaf and seed, could not be secured by any machinery except the oral outfit of the grazing animal. Besides this, dried herbage is richer in nutritive materials than a stranger might think, because its maturity is forced upon it by the heat and drought, and it retains such richness in its dried fibers that it is not at all to be compared with the dead grasses of humid climates. The most obvious demonstration of this fact is the sight of cattle, sleek and fat, on brown fields, apparently, too, as bare as they are brown, gaining full nourishment from the rubbish-like seeds and dry herbage spread over the sun-baked soil.

PASTURAGE SEASONS IN CALIFORNIA.

Speaking generally, the growth of grass in all parts of California, except the mountain region, begins with the fall rains. These rains come from the north and occur first in the upper coast region and then in the northern half of the interior valley region. The mean date for this opening of the growing season in northern California is October 8. Later the lower coast region is reached, and after that the southern half of the interior valley region, the mean date being November 1 for the southern half of the State. The ideal, or as common parlance goes, the "good year" is one in which the rains occur at short intervals, so that continuous pasture growth is maintained after the naturally sown seeds are once germinated. In such a year the cattle are wading knee-deep in succulent vegetation from January until May. The landscape is carpeted with the varied hues of wild flowers, the cattle are sleek, and the flow of milk is forced by agreeable temperatures and a wealth of juicy forage. Except on pastures heavily overstocked there comes after the rains are over a good amount of dry feed, already described, and the scattering of enough seed to insure a good start of plants at the coming of the following fall rains.

This is the "good year" during which the stock find abundant feed in the field for the full twelve months, and it is this good year which is to be credited with both the fullness and the lack in California dairying. The good year does not always come, and the modifications of it are sometimes trying. The rains, which sometimes come too early, may be followed by two months of drought; they have given moisture enough to spoil the dry feed and to start the seeds of the new growth which the drought destroys. This time the fields are really bare and yield no forage, and the dairyman having learned to trust in a good

year, has to risk this year's profit by buying feed which he ought to have grown, and would have grown if he had not indulged the illusion that he would not need it. In his dairy economy he has planned to have his milk flow come with the new grass, and his cows shrink because, instead of full pasturage, they are given a scant ration of hay, which is doled out because the backwardness of the pastures has induced an unusual demand and a consequent advance in the price of hay.

Again, perhaps the season may depart from the ideal because of excessive rains and cold, driving storms in which his cattle suffer from exposure for lack of shelter, which the counting on a good year has convinced him was unnecessary. Again, there may be a departure in the shape of unusual succession of frosts and possibly a snow flurry, and then the cattle suffer both from scant growth of herbage and lack of shelter. It is because of this too great trust in California skies and winter fields that the old style of open-air dairying is often disappointing. It is a mark of the present progressive dairying to provide extra feed and shelter and good dairy buildings generally, because they are a surety against loss, although they may not always be required.

THE MILKING SEASON AND WINTER FEED.

These statements are necessary to an understanding of the length of our pasturage season and the vicissitudes which attend it. The length of the milking season will average about nine months; in many of the better herds it is ten months, and that is about the period which is aimed at by others who do not quite attain it. On the other hand, in some of the remote counties, the cows divide their time about equally between resting and milking. In such cases the cows have to "rustle" for feed and shelter during the winter, and are milked only during the grass season of the higher altitudes.

In all except the mountain region the length of the pasturage season is about nine months; and though usually the cattle are kept afield the whole twelve months, for about three months they are given some supplementary feed. In dairies adjacent to San Francisco and Los Angeles, and here and there elsewhere, there are dairymen who find it profitable to follow modern methods in using rations of various purchased feedstuffs in connection with hay and pasturage, but over the greater part of our dairy area the cows have only what the ranch produces. In the alfalfa districts they have alfalfa pasturage in summer and alfalfa hay in winter, for this plant does not make a good winter growth, though in the same regions there is often a growth of salt grass, which adds succulence to their hay ration. In the coast regions, where alfalfa does not find the heat it desires, dependence is placed upon hay of the wild, winter growths, or of barley or wheat cut before ripening. In Humboldt and Del Norte counties, as well as along the moist river lands of the central part of the State, there is a growth of the common

red clover (*Trifolium repens*), which yields a heavy cut of hay; but this plant dislikes the drought of other parts of the State. Nearly everywhere, on the moister or irrigated lands, very heavy crops of roots and marrowfat squashes are grown in the summer for late fall and winter feeding, and the climate is such that these products need no storage, but are fed right from the field whenever they are needed.

SUCCULENT FOOD DURING THE SUMMER DROUGHT.

It has been shown above that in our best years very little winter feeding is necessary, and even then only for a short period. The time when extra feeding is most desirable to maintain the flow of milk is in the late summer and fall. Some dairymen plan to have this their closed season, and with the cows coming in fresh in the fall, about the time when the new grass should put in its appearance, they practice winter dairying with fresh pasturage, which would seem to be a very natural arrangement for this climate. But even with this arrangement, or without it, it is exceedingly desirable to maintain the flow as late into the summer or fall as it can be profitably done. This is the season of "dry feed," previously mentioned, and even if such feed be abundant and rich, as described already, its lack of succulence checks the milk flow, and it gives the product something of the character of the Eastern winter butter. It is to maintain the character of grass products, as well as to increase the quantity of them, that much effort is made in those sections where the pastures dry up early. Available moist land is made to grow fodder corn or sorghum, which does vastly better in the hot, dry air of the interior than roots and squashes and other crops which furnish succulence in a time of drought. It is for this part of the year, and not for winter, that the silo is now being used by some dairymen, both North and South, and it is probable that it will be used more generally in the future than it has been in the past. To preserve for autumn the succulence of spring growth seems to be its chief function in California. At this time of the year, too, there is now becoming available considerable quantities of pulp from the sugar-beet factories, and this is also being siloed for winter use when necessary.

THE BEST DROUGHT-RESISTING FORAGE PLANTS.

For the improvement of California pastures it has long been seen that drought-resisting grasses and forage plants are very desirable. The great mass of the natural growth, and the chief of the introduced plants which found their way in at some remote period, are annuals. As soon as overstocking reaches the prevention of self-seeding, the pastures decline. For years the cry has been for perennial plants which would hold life in the root, and continual effort has been made in this direction by the California Experiment Station and by enterprising individuals. Our greatest acquisition has unquestionably been

alfalfa, but alfalfa does not endure hard, dry soil; it requires depth and permeability and moisture within reach of its roots, and heat greater than some of our coast regions afford, to do its best. Of all the introductions of the last quarter of a century the best can be quickly named. They are perennial rye grass, especially from seed which comes to us after acclimation in Australia, and is locally known as "Australian rye grass;" orchard grass; meadow soft grass (*Holcus lanatus*), locally called "mesquite;" Texas blue grass (*Poa arachnifera*); tall oat grass (*Arrhenatherum avenaceum*); Schrader's brome grass (*Bromus unioloides*), and Hungarian brome grass (*Bromus inermis*). These grasses make a good winter growth, and being once well-established maintain life in the root through the dry season, not only furnishing moderately succulent forage during the dry season, but starting into active growth with the first fall rains. They will not do this in our very driest lands, but they will hold on in regions fit for dairying. They are coarse grasses compared with the choice summer grasses of humid regions, but, under the circumstances, they serve a very good purpose.

It is the spontaneous growth during our rainy season which should be compared with the summer growth of humid regions. This growth includes a large number of native species of grasses and clovers, different groups of species prevailing in the different parts of the State. Two foreign plants introduced in remote times also notably contribute to our winter pasture. They are the bur clover (*Medicago denticulata*), already mentioned, and alfilerilla (*Erodium cicutarium*). They cover the ground with a mat of the most tender herbage after the earliest fall rains, and respond with freedom of growth proportionate to the abundance of the winter rains, often yielding a good cut of hay in some parts of the State.

WINTER SHELTER IN CALIFORNIA.

Some hints of the winter care of our dairy stock have already been given in connection with the discussion of pasture. It should, however, be plainly stated that our winter or rainy season climate is so mild that it is possible to conduct a dairy without any shelter whatever for the cattle, and probably three-fourths of our cows have none. They pass the days and nights on the pasture ranges and are gathered into paddocks or "corrals" twice a day for milking. While it is possible to do this it is clearly not desirable, and though it saves the cost of sheds or barns, it is evident from the experience of those who follow a better system that the increased yield and better quality of product from cows which have shelter, when shelter is desirable, more than pay good interest upon the investment required to provide buildings. Cows which are compelled to stand through chilly and sometimes protracted storms can not do their full duty at the pail. Food has to go to maintain living temperatures in the body during such stress of weather.

Although our winter temperature, in all except the mountain region, rarely falls below freezing, the drenching of cold rains is still a severe tax upon animal endurance. Besides, milking in the open air during such storms is bad for the cows, bad for the milkers, and especially bad for the milk. Milking in the rain carries much of the hide-wash into the pail, and where the corral is floored with soft mud and manure so that the udder is befouled, it is next to impossible to get clean milk. California dairying is often condemned for such practice, and it should be, but in current comment the occurrence of the evil is often exaggerated. The contamination of the milk by corral dust in the summer is also a constant danger. It requires the greatest effort to avoid filth in open-air dairying. To accomplish this and for the benefit of the cows, and the comfort of the milkers, there has been a notable increase during the last few years in the number of barns and sheds on our dairy farms, and some adopt the practice of always milking under cover and of retaining the cows in the stanchions during heavy storms, and at least one establishment, that of D. D. Wilder, of Santa Cruz, not only has fine cow barns, but lights them and the adjacent corrals with electric lights. The conclusions of the most thoughtful dairymen on this subject are outlined well by Mr. James Boyce, manager of the Diamond Springs Creamery, Humboldt County, in these words:

> Cows are stabled at night about thirty-five to forty nights in the year and fed hay and roots. In some localities no barns are used; cows are milked in open corrals, and only get the grass that grows. But cows do better when sheltered from the rain and fed in warm barns during the rainy season of each year.

The importance of this matter is of course greater in regions of heavy and protracted rain storms and tenacious soils. In parts of the State where there is a light rainfall and sandy soils, the open-air system is less objectionable, but even in such places there are those who believe in good buildings and generous feeding in addition to pasturage. In the mountain region good dairy barns and ample winter food are provided as the wintry conditions require them.

WATERING DAIRY STOCK.

The water supply has been suggested in the foregoing descriptions of the dairy regions. Wherever perennial flowing streams exist they are fully drawn upon. Over a much greater area of the State, however, dependence is placed upon wells and windmills or upon flowing artesian wells, and in some cases upon water from irrigation ditches. This water is always of moderate temperature and no special methods of watering stock are employed.

MONTHS OF GREATEST PRODUCTION AND THE YIELD PER COW.

The months of greatest milk production in the southern half of the State, and in the interior, both north and south, are April and May. In the coast region north of San Francisco, owing to the later season

of green grass, the two best months are May and June. But all the months from March to July, inclusive, give a good milk yield, and by due effort for feed and seasonable calving the dairy is run at considerable capacity the whole year. Except in the mountain region, many creameries are operated the whole twelve months.

The estimates of a satisfactory yearly product for an average cow, furnished by a large number of dairymen, vary widely. One correspondent places it as low as 150 pounds of butter and several cite 300 pounds. From 200 to 250 pounds of butter in a year is the range mentioned by most correspondents. Though there are bands of 30 to 80 cows reported from Humboldt County as ranging from 275 to 325 pounds of butter yearly, it is plain that such dairies are above the average, both in breeding and selection, or in feeding, or in both.

NUMBER OF CREAMERIES IN CALIFORNIA.

It is exceedingly difficult to state exactly the number of the manufacturing establishments which should be called creameries or butter factories in distinction from private dairies. This is due to the system of large dairy proprietorship in this State to which allusion has already been made. If we should call that alone a creamery which handles the milk of several producers, we should give creamery honors to some establishments which are smaller in cost and in production and less thoroughly equipped than other establishments which handle the milk of a single owner or renter of cows. As a matter of fact, the term "creamery" has often come, in this State at least, to signify any concern, however owned or managed, which is equipped with power, centrifugal separators, and the other concomitants of modern dairy practice.

As prices for dairy produce have declined to a level very near the actual cost of production, even by means of the best appliances and the most economical processes, there has been during the last few years a very general disposition to follow creamery practices as the only means of survival. The result has been a remodeling of the large private dairies as well as the organization of cooperative creameries. The largest and most successful creameries are situated in the coast regions both north and south of San Francisco. Occasionally one of these has proved illy placed or badly planned and defectively furnished, for dishonest and slipshod work in dairy building and equipment have been experienced here as elsewhere. We have also suffered to some extent from the nefarious efforts of the creamery "boomer," or promoter, and creameries have been constructed where there are no cows. Of these the buildings have been put to other uses and the machinery set aside or sold at a sacrifice.

By the closest computation that can be made, the number of establishments which are operating upon the creamery plan in California in 1896 is 300. Of these, 100 are creameries, receiving the milk from a number of patrons, and 200 are private dairies with power separators

and other creamery adjuncts. These "private creameries" average about 150 cows each, with some of them having as high as 400 cows. The cooperative creameries range in cows from 250 to 4,000, with an average of 500 cows. Of these establishments about one-half are proprietary and the other half about equally divided between joint-stock and cooperative. All sorts of opinions are given by correspondents as to the comparative advantages of the different kinds of ownership. The joint-stock plan, if most of the stock is owned by the farmers of the neighborhood, seems to be most generally approved.

WIDE USE OF CENTRIFUGAL SEPARATORS.

All the creameries of California are conducted upon the separator plan. As previously stated in connection with the description of the dairy regions, the absence of natural ice and cool water in all save the mountain region renders all deep-setting devices impracticable, though refrigerating machines are being introduced for creamery use. The only issue then is that between the separator and the shallow pan, and the separator is the sine qua non in our creameries and is rapidly pushing out the pans in the smaller dairies as well. All the prominent patterns of separators are in use. The largest creamery in California is the establishment of the Guadalupe Creamery Company (cooperative), located at Guadalupe, on the coast, in the northwest corner of Santa Barbara County. It has capacity for the milk of nearly 4,000 cows, and is in a region of very large dairy holdings. It has one skimming station and uses altogether six separators, mostly of the Alpha De Laval pattern, and has received at times 60,000 pounds of milk per day. A very good representative report is that furnished by the Diamond Springs, at Swauger, in Humboldt County. In 1895 it received milk every day in the year, recording a total of 5,523,000 pounds of milk, from which there were made 263,000 pounds of butter; and 500 hogs, of from 100 to 200 pounds weight each, were grown upon the skim milk. This creamery paid out to 41 patrons the sum of $50,000 during the year. The largest amount of milk received in a single day was 40,000 pounds. This milk was handled with four separators. Other reports are as follows: Union Creamery, San Luis Obispo County, 20,000 pounds per day, two Alpha De Laval separators; in Eel River Valley, Humboldt County, five creameries of about equal size use four separators each, mostly Alpha De Laval; Scott Valley Creamery, Siskiyou County, 12,000 pounds, two Sharples separators; San Bernardino Creamery Association, 10,000 pounds per day, one Jumbo; Norwalk, Los Angeles County, 16,000 pounds, Alpha De Laval; Westminster Butter and Cheese Company, Orange County, 10,000 pounds per day (including two skimming stations), one Jumbo at creamery and one Alpha De Laval at each skimming station.

The Babcock test is almost universally adopted as a basis for payment for milk.

LENGTH OF SEASON AND SUNDAY WORK.

As already stated, almost all of the creameries in the coast regions run continuously throughout the year. A few stop during January and February. As for Sunday labor, there is some variation in practice, though the rule in the larger establishments is to operate on Sundays just the same as on other days. At San Bernardino only separation is done. This gives the patrons the skim milk for feeding and saves the housewives the care of the milk at home. In some other establishments no extra cleaning is done on Sunday, which somewhat shortens the day for the workmen.

MILK VALUES IN DIFFERENT MONTHS.

The returns made to patrons for milk, and the months during which high and low values rule, can best be shown by reference to reports received from widely distant parts of the State:

The San Bernardino Creamery Association reports returns per 100 pounds of milk during 1895, as follows: January, $1.10; February, $1.05; March, 90 cents; April, 75 cents; May, 70 cents; June, 65 cents; July, 80 cents; August, 90 cents; September, $1; October, $1; November, $1; December, $1.05.

W. W. Cocke, proprietor of the Star Cheese Factory, Downey, Los Angeles County, paid for milk, on a basis of 4 per cent butter fat, as follows: January, $1.15; February, $1.15; March, 74 cents; April, 74 cents; May, 78 cents; June, 87 cents; July, 87 cents; August, 95 cents; September, $1; October, $1.02; November, $1.10; December, $1.15.

P. A. Raab, proprietor of Bolsa Creamery, Orange County, reports payments per 100 pounds of milk as follows: January, $1.10; February, 90 cents; March, 65 cents; April, 50 cents; May, 57 cents; June, 65 cents; July, 80 cents; August, 89 cents; September and October, not running; November, $1.10; December, $1.20.

The following are returns in cents per pound of butter fat for three creameries in Humboldt County in 1895:

1895.	Diamond Springs.	Excelsior.	Riverside.	1895.	Diamond Springs.	Excelsior.	Riverside.
January	22			July	14½	15	15
February	17			August	23½	21¾	23
March	14	13	14	September	20½	19½	21
April	12	12	12	October	23¼	23¼	23½
May	11½	11	11	November	31	31	31
June	14	13⅜	13	December	26½	25	26½

Grizzly Bluffs Creamery, Humboldt County, reports the average value of butter fat for the year 1895 at 18.69 cents per pound. At the Star Creamery in Sacramento County, which is in the alfalfa pasturage region, the total milk received during the year 1895 was 2,684,240 pounds, which yielded butter at the average rate of 4.34 pounds to the 100 pounds of milk, and returned to patrons a net amount of

$17,084.97, or 63⅔ cents per 100 pounds of milk. The average price of butter was 18⅔ cents per pound, the average freight and commissions a little less than 1 cent per pound, and the factory charge 4 cents per pound. This creamery had the advantage of a local market in the State capital, which is adjacent to the establishment.

PROPORTION OF CREAMERY PATRONS.

The creameries have usually succeeded in securing the patronage of nearly all the dairy farmers except in localities where the large-holding dairy system has brought creamery outfits into individual establishments, as already considered. An instance of this is in the Bodega district of Sonoma County, where but one-third of the dairymen patronize the creamery. In contrast to this state of affairs, in the leading valleys of Humboldt County more than nine-tenths of the dairymen carry milk to these establishments, while in the county as a whole more than one-half take this course.

DISTANCE OF MILK CARRIAGE.

The distance covered in carrying milk from the farm to the creamery is reported from Knights Landing, in Yolo County, where the distance is placed at 10 miles. As it is a region of riverside farms, it is contemplated to convey milk by a small steamer on the Sacramento River even from greater distances. The longest distances reported by inland creameries are 8 miles in Siskiyou County, 7 miles in San Luis Obispo and Mendocino counties, and 6 miles in Tulare and San Bernardino counties. Usually the longest hauls reported are 5 miles and the average from 1½ to 2½ miles.

FARM DAIRIES IN CALIFORNIA.

The farm dairy, as it is understood at the East, is very rare in California. What has been said of the beginnings of dairy work in this State shows that it did not spring from the farm house. Except at a few points in the early mining regions, where families drove their cows across the plains to the great dairy ranches on the coast, the dairy was man's work from milking to manufacturing. In early times in California women were too rare and precious to send into cow corrals or churn sheds. Profits were large enough to allow the dairy owner to hire all the men he needed, even at the high wages then current, and, besides, petticoats were things of which the cows of that day were in terror. As man was leader, the enterprise had to be large—for the Californian of that day had a horror of pothering with anything small—and rather than be in bondage to the family cow he would buy his butter and go without milk. While this condition has always prevailed in this State, and while on many ranches there were scores of horses and not a single cow, there has always been some farm-house dairying,

and with the increase of thrifty farmers milk and butter for family use are now generally provided, except in settlements of small fruit farmers whose land and time are too valuable for dairy production.

Of the methods prevailing in the California style of private dairies before the introduction of centrifugal separators it is not necessary to speak at length, because they are quickly passing away. The small pan setting of milk was universal until the introduction of hand separators, because the absence of ice and cool water, except in the mountains, made all deep-setting contrivances impracticable. Various designs for cooling by evaporating water from sacking or other fibrous material surrounding the milk receptacles were proposed, but never widely used, except in keeping cream taken from shallow pans to await churning. Dairy rooms with walls of porous terra-cotta plates, through which water might ooze from an outside source and evaporate from the inner surface, have been projected, but never existed except on the original drawings. Tight double-walled and double-roofed milk houses, closed during the day and opened at night, when the air is always relatively cool in California, are the sum of the cooling arrangements employed except in some of the more generously equipped concerns where small freezing-machine outfits have been introduced.

The frequency of churning in these private dairies depends upon the size of the herd. As someone of alleged skill is employed as butter maker, it is aimed to have milk enough to churn every day; but in the smaller concerns churning is done at different intervals, even once in four days, which is the longest time mentioned by any of our correspondents. In the dry air of California milk keeps in good condition, even though no low temperature can be secured. Dairy butter is almost entirely put into rolls and sold at once. If packed either by the producer or by the city receiver in a time of surplus receipts, the rolls are put down in casks in their original form, packing the rolls as closely as possible without spoiling their shape, and filling the cask with brine. This is known locally as "pickled roll," and it is usually sold, just as it comes from the brine, several months afterwards, though sometimes a sort of renovating process is practiced by freshening and wrapping the rolls in new cloth, but this revived "fresh roll" seldom deceives anybody. More recently the use of cold storage in San Francisco has reduced the amount of pickling. The ruling amount of salt used in California butter, both creamery and dairy, is 1 pound of salt to 20 pounds of butter, although individual makers report 1 pound to 16. There is a little difference in the amount used in summer and winter, say at the rate of one-eighth of an ounce to the pound more in summer than in winter.

The creamery and farm-dairy butters are sold in the same markets, and the product by the modern method has quite an appreciable advantage in price. This is proving a potent factor in the transformation and reequipment of ranch dairies, as well as inducing the establishment of cooperative creameries.

THE CALIFORNIA BUTTER ROLL.

The almost universal form given to the California butter product, both from creameries and private dairies, is the 2-pound "roll" or "square." The first is a cylinder, the second a parallelopipedon. The original form was the cylinder bearing the imprint of the maker on the upper end, and these were originally of 2 pounds weight and were packed in flat boxes with hinged covers, holding 60 rolls. The depth of the box is a little more than the height of the roll, a cloth being placed over the ends of the rolls when the box is closed. Each roll is wrapped in muslin or butter parchment paper. As purchasers bought the butter at so much a roll, there crept into the trade very early a practice of slightly reducing the weight of the roll, so that the retailer who bought the butter by the weight of the box would have more rolls to sell by the roll. The first retailer who conceived this bright idea was thus enabled to undersell his competitors on the price per roll, and the reduction of the weight was at first so slight as not to attract attention. But the departure from full weight set a vicious example, which was soon followed and exceeded until the "2-pound" roll weighed only $1\frac{3}{4}$ pounds. Retailers would not buy full-weight rolls because they could not meet the ruling prices for a roll, and the producers were obliged to reduce the contents of their butter molds or lose in the price they could get per pound. This little matter of the size of a roll has been a constant subject of discussion for the last twenty years. Finally, in 1893, the State legislature passed a law entitled an act to prevent the sale of short-weight rolls of butter: "Any person or persons, firm or corporation, who offers for sale roll butter not of full weight to each roll, shall be guilty of a misdemeanor." But the act does not define a legal roll. No effort has been made to enforce this law, but there has been a growing sentiment in favor of full-weight rolls. The California Dairy Association has resolved in favor of them, and many creameries resolutely make them, but it is probable that it will be some time before the "short roll" will wholly pass from view.

Since the introduction of creamery practice some butter has been marketed in tubs, but probably not more than one-tenth of the creamery product takes that form.

CALIFORNIA FORMS OF CHEESE.

The local form of cheese which was early adopted in California because of its portability and ease of cutting was what is known as a "flat." The flat has about the same diameter and half the height of the ordinary Eastern factory size, and weighs from 25 to 30 pounds. It had originally the local peculiarity of having the color in the bandage instead of in the cheese—a white cheese in an orange-red bandage. This style still prevails, but "Young America" and Eastern factory styles are now followed to some extent, and the use of color in the curd instead of in the covering is now the rule even when the old form is followed. There has been some disposition to introduce the Eastern

style of cheese box, but as the boxing has to be brought in the shook from the East, the use has been limited. Almost all the common forms of cheese originally come to the market "naked" or in packages of three cheeses in a burlap grain sack, and they are delivered by the receivers to the jobbers' or retailers' wagons in San Francisco without covering. When shipped to distant consuming points, two or three cheeses are cased in a square box made so as to fit closely and the cost of casing charged up to the cheese producer. This burden he has always protested against, especially as the charge for casing has been thought to yield the commission man something more than the service actually cost him. More recently a well-made box or case has come into use. It carries several flat cheeses and is returned to the factory by transportation companies without charge when empty.

Almost all the cheese made in California (except that made occasionally in creameries during low butter prices) is the product of proprietary concerns, and probably nine-tenths of it is from milk produced by cows owned or leased by the maker. The product is therefore almost wholly farm or ranch cheese, but the reader will understand that many of these farms produce as much milk as is received by the smaller Eastern "factories" and manufacture it in as enlightened a manner. Farm dairy cheese, as the term is used in the East, is hardly known in California. In country stores, however, there are always adequate supplies of California dairy or factory cheese, and it is retailed at all prices from 9 to 20 cents per pound, according to quality or distance from producing points. The average price for California cheese at retail is 12½ cents per pound.

Of the cheese branch of California dairying it may be said that it has never been developed as the natural adaptations of the State suggest. The prejudice for Eastern cheese, which has already been mentioned, is a serious obstacle and prevents the local producer from securing even the best of the local trade, which through limited population is necessarily small. There is at present no distant market which invites supply. The lack of inducement is perhaps to be cited as the reason why the local cheese interest has never developed commensurately with the butter interest. And yet California conditions favor the cheese maker in a notable degree. The dry air rules out that condition of "mugginess" which gives the Eastern factory man so much milk which calls for the use of high acid in the curd. The milk, in all save the hot interior at least, is clean and good. Some makers declare that in an experience of years they have never seen a "floating curd," and one maker reports from Humboldt County that it is the "easiest place to make cheese" he ever saw. This is common observation, and the fact that the sweet-curd process is widely employed is also very significant.

DAIRY MARKETS OF CALIFORNIA.

San Francisco, with thrice the population and more than thrice the local and distributing trade of any other California city, has always

been naturally the great dairy market of the State. There is in fact only one other city which approaches even to one-third of the dimensions of San Francisco; that is Los Angeles, and she has only recently arrived at this estate. The growth of Los Angeles, and southern California generally, has, however, recently created a diversion of a part of the dairy trade southward, for the consumption of dairy goods in southern California is still considerably greater than the increased local production. Speaking generally, the surplus dairy production of the northern two-thirds of California goes to San Francisco and of the southern one-third to Los Angeles. Along the borders of this division shipments go either way, as the demand seems to warrant; but aside from this general movement, San Francisco reships large quantities to southern California, and sometimes the product of Nevada creameries goes direct to Los Angeles as a better market than San Francisco.

The receipts of butter and cheese in San Francisco during the year 1895, as compiled by the Journal of Commerce, were as follows:

	Pounds.
Butter:	
California manufacture	13,796,000
Oregon	413,000
Eastern	184,500
Total	14,393,500
Cheese:	
California manufacture	4,624,500
Oregon	132,400
Eastern	1,738,270
Total	6,495,170

The extension of the creamery interest in California has taken from San Francisco somewhat of its importance as a distributing market to the towns of the State, because creamery managers have developed direct trade with jobbers and retailers in the smaller towns as far as possible. Formerly there were large supplies sent from San Francisco to Portland and the Puget Sound cities. Recently the dairy development of Oregon and Washington, and the enterprise of the creamery interests of the region northwest of Chicago to ship their surplus westward by the Northern Pacific, have very much reduced California's sales in the northern regions of our coast. These regions are, in fact, so well fitted for dairy production that they will probably soon have a considerable surplus, for which they must seek distant markets.

San Francisco enjoys the distinction of being the third port of the United States in the export of dairy produce, New York and Boston alone exporting larger amounts; but this distinction is secured upon a very small volume of trade. The total valuation of the butter and cheese exports from San Francisco in 1894 was $118,530, and in 1895, $99,075. Of these amounts nearly one-half went to British Columbia, and for this trade in the future California must contend with the development of local production in the Dominion and compete with the

coming surplus in the nearer States of Oregon and Washington, already alluded to. The other half of San Francisco's exports of dairy goods is distributed all over the countries bordering on the Pacific, including the Hawaiian Islands, the Asiatic countries, the islands of Oceanica, Mexico, and Central America—a magnificent geographical area, but one in which dairy demand is confined almost entirely to the small colonies of Europeans located at points of commercial importance. Californians have indulged in some speculations as to the possibility of developing dairy trade in these densely populated parts of the world, especially in Japan, and the same intention has been disclosed by the shippers of creamery products from the region northwest of Chicago, but there is much doubt whether these Asiatic people will change from their long established food supplies much faster than they will learn to produce for themselves. Shipments of dairy cattle have been frequently made from California to Japan during the last ten years, and their acquisition of dairy arts may be expected.

EASTWARD SHIPMENT OF CALIFORNIA BUTTER.

Some moderately encouraging results have been attained in shipping fresh California butter to the regions east of the Rocky Mountains during the closed season of Eastern dairies, but the growth of winter dairying at the East, the improvements in cold storage, and the improvement of Eastern winter-made butter by the use of succulent silage in connection with the old style of wintering on dry feed, coupled with the vast superiority of the keeping quality of creamery butter over the old firkin product, tends to reduce the field which California fresh winter butter might have enjoyed if the Eastern product had not thus improved. Still it is hoped that by developing the creamery system here, and thus rendering available large uniform lots of butter for Eastern shipments before the Eastern grass butter comes forward, California may find some outlet eastward at favoring times of the year for an amount at least equal to the shipments from the East to California during the months when our output is small. Either this must come or some very notable increase of local population, by the development of mining interests which are now very promising or by other local industrial advancement, is necessary, before any great increase of the present dairy production of California will be warranted. In fact, in the upper San Joaquin Valley, with no large towns and a long haul by rail through a hot valley to reach either San Francisco or Los Angeles, two cheese factories did not open in 1896 because of oversupply in local markets. But while this is the case, there is still a steady consumption of Eastern and foreign cheese in preference to California cheese. For the last five years this supply has averaged about 1,750,000 pounds annually, and this continues, although California producers have made some effort to give their product the form and character of the popular Eastern and European cheeses. There is a prejudice among certain classes of

consumers for "imported" goods which handicaps local producers in their efforts to produce similar articles. This is in part inexplicable, and in part due to the inheritance of a bad name from our earlier years of careless dairying.

DAIRY ORGANIZATION AND PROTECTION.

The first State Association of California Dairymen was organized in 1876. It was modeled after the leading associations east of the Rocky Mountains. Several interesting conventions were held in San Francisco, but the dairy public did not manifest the interest which was expected and the effort was abandoned. In 1882 the industry was menaced by a proposition to establish an oleomargarine concern in San Francisco, and this provocation rallied the legitimate producers in a large convention held in December of that year. A draft of an enactment against imitation dairy goods was agreed upon and it was passed by the California legislature in the winter of 1883. It was a good law, but it offered no reward for information and the dairymen relaxed their cooperative efforts as soon as the law was safely inscribed upon the statute book. There was then no machinery to promote prosecution, and the only effect of the law was to prevent local investment in oleomargarine enterprises. Year after year, however, imitation products were brought in from the East and freely sold in defiance of the law without prosecution. Just as soon as prices showed a tendency to advance with the lessened dairy production of the autumn, great quantities of the spurious goods were shipped overland to California, to the great distress of producers of the pure article. The passage of the United States law led to delay in the hope that it would check the evil. At last, in 1893, it was evident to dairymen that they must do something more effective than they had yet accomplished in their own behalf, and a new association, called the California Dairy Association, was organized in the fall of that year, which has constantly increased in membership and has full promise of permanence. It held excellent conventions in San Francisco in 1894 and 1895, and during the present year has held monthly meetings at different dairy centers in addition to its annual convention. But the chief achievement of the association, supported by the dairy interest at large, was done at the session of the California legislature of 1895 in the enactment of a new dairy protective law and the creation of a State dairy commission to enforce its provisions. The law providing for these two results was approved March 9, 1895, and is condensed as follows:

The coloring of oleomargarine or other imitation product in imitation of butter or cheese made from unadulterated milk is absolutely prohibited. And the possession of, sale of, or offering to a patron for consumption, such imitation product when colored to imitate the genuine, is a misdemeanor.

The use of the words "butterine," "dairy," "creamery," or of dairy symbols in connection with the sale or advertisement of the imitation product is absolutely prohibited.

In the handling of the imitation product, the manufacturers, shippers, carriers, wholesalers and retailers, peddlers, bakers, hotel, restaurant, and boarding-house

keepers must comply with certain regulations as to the labeling of the packages, the specification by printed statement of the contents and the proper notification of the purchaser, consumer, or patron.

Other provisions of the law invalidate a contract made in violation of the act, prohibit the use of imitation products in charitable institutions; make the effacement of labels and marks a misdemeanor; provide what is evidence of intention to violate the act; authorize the State Dairy Bureau to make use of the search warrant; require the district attorney to prosecute and the informer to receive half of the fines; and establish a State Dairy Bureau for the period of two years and with a fund of $12,000 for the enforcement of the act. Violation of any of the provisions of the act is a misdemeanor, and a first offense is punishable by a fine of not less than $50 nor more than $150 or by imprisonment for not more than thirty days; and subsequent offenses are punishable by a fine of not less than $150 nor more than $300 or by imprisonment for from thirty days to six months, or by both.

In compliance with the terms of this law, Messrs. L. Tomasini, Thomas Flint, sr., and George W. Burbank were appointed to constitute the State Dairy Bureau, which began on May 1, 1895, a vigorous prosecution of the law. This action resulted in the abandonment of a projected local manufactory of oleomargarine, and vigilance on the part of the bureau has reduced the trade in imitation products made elsewhere to a very small aggregate. This result, coupled with the low price of butter, has practically freed California, for the time being, at least, from competition with imitation products which had been for years very grievous. The secretary and executive officer of the bureau is William Vanderbilt, and the offices are at 113 Davis street, San Francisco.

In addition to the foregoing official organization for dairy promotion and protection, are the following voluntary associations for the purposes specified:

California Dairy Association.—Incorporated September 2, 1893, for educational and legislative objects. Directors: Joseph Mailliard, president, San Geronimo; A. P. Martin, first vice-president, Petaluma; William N. Russ, second vice-president, Eureka; John A. Cole, third vice-president, San Bernardino; F. H. Green, treasurer, San Francisco; Samuel E. Watson, secretary, San Francisco; W. W. Wynn, Livermore; William Niles, Los Angeles; R. H. Brown, Pescadero; H. M. Le Baron, Valley Ford; P. Tognazzini, Cayucos. Meets monthly at different points and holds annual convention. Reports sent on application to secretary, 113 Davis street, San Francisco.

Dairymen's Union of California.—Incorporated August 17, 1891, with capital stock of $250,000, subscribed by dairymen, to carry on a general commission and produce business. Directors: Warren Dutton, president; G. W. Burbank, vice-president; E. W. Steele, treasurer; J. R. Denman, secretary; L. Tomasini, manager; Samuel Donati, F. Madonna, P. Tognazzini, A. Tognazzini, M. Righetti, S. Cheda. Location of business, 113–119 Davis street, San Francisco.

Dairymen's Association of Southern California.—Organized in July, 1894, for educational and legislative purposes. Directors: D. Durkee, Rincon; C. E. Mitchell, Clearwater; W. H. Smith, Norwalk; P. F. Cogswell, El Monte, and G. E. Platt, Los Angeles. Officers: C. H. Sessions, president, Los Angeles; George H. Peck, vice-president, El Monte; R. R. Risdon, secretary, Los Angeles. Meets quarterly, on the second Saturday of January, April, July, and October.